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Theoretical:

Hough Transform (Lecture 4)

A1:

slope-intercept form: y=mx+b (m=>slope, b=>y-intercept)
double-intercept form: $\frac{x}{a}+\frac{y}{b}=1$ (a=>x-intercept, b=>y-intercept)
normal form: $x\cos\theta + y\sin\theta = \rho$
y=-4x+2
y+4x=2=>y/2+x/(1/2)=1
x cos14.07+ y sin14.07 = 2/($\sqrt{17}$)

$$\rho^2 = \frac{1}{\frac{1^2}{a}+\frac{1^2}{b}} = \frac{1}{\left(\frac{1}{2}\right)^2+2^2} = \frac{4}{17}, \quad \rho = \frac{2}{\sqrt{17}}$$

$$\cos\theta = \frac{2}{\sqrt{4+\left(\frac{1}{2}\right)^2}} = \frac{4}{\sqrt{17}}, \theta = 14.07°. \quad \sin\theta = \frac{0.5}{\sqrt{4+\left(\frac{1}{2}\right)^2}} = \frac{1}{\sqrt{17}}$$

- Incrementing in Hough space accumulator array

A2:

b \ m	-1	0	1	2	3	4
-1			1			
0						
1		1				
2	1					
3	1	1				
4			1			

(denoted as blue numbers)
b=3, y=mx+3 crosses (2,1), m=-1
b=1, y=mx+1 crosses (2,1), m=0
b=-1, y=mx-1 crosses (2,1), m=1
(denoted as green numbers)
b=2, y=mx+2 crosses (-1,3), m=-1
b=3, y=mx+3 crosses (-1,3), m=0
b=4, y=mx+4 crosses (-1,3), m=1
there is no local maximum in the voting of these two pixels. The resolution of accumulator and the number of sampling are important.